

Listing of Claims

This listing of claims replaces all prior versions, and listings, of claims in the application:

1. (Currently Amended) A method comprising:

identifying a pair of features to be printed using a corresponding pair of patterning elements, the pitch of the pair of features being sufficiently small that, upon printing, diffraction will make a separation between the features smaller than a separation between the corresponding pair of patterning elements; and

increasing a separation distance between the pair of patterning elements while maintaining the sufficiently small pitch ~~between the corresponding imaged features.~~

2. (Original) The method of claim 1, wherein increasing the separation distance comprises distorting at least one of the patterning elements to have a decreased dimension in a direction parallel to the pitch in the vicinity of the sufficiently small pitch.

3. (Original) The method of claim 2, wherein increasing the separation distance comprises distorting the at least one patterning element to have an increased dimension in a direction perpendicular to the pitch.

4. (Original) The method of claim 1, wherein increasing the separation distance comprises distorting the patterning element to have substantially the same area as the undistorted patterning element.

5. (Original) The method of claim 1, wherein increasing the separation distance comprises designing the patterning element to directly and indirectly pattern a feature with a feature dimension in the direction parallel to the pitch substantially equal to a feature dimension in the direction perpendicular to the pitch.

6. (Original) The method of claim 1, wherein increasing the separation distance comprises bowing at least one of the patterning elements away from the other in the vicinity of the sufficiently small pitch.

7. (Original) The method of claim 1, wherein identifying the pair of features comprises identifying the corresponding patterning elements used to print the pair of features.

8. (Original) The method of claim 1, wherein identifying the pair of features comprises analyzing a machine readable description of one or more of the pair of features and the corresponding patterning elements used to print the pair of features.

9. (Original) The method of claim 7, wherein identifying the pair of features comprises identifying a contact pair to be printed on the substrate to form part of an SRAM semiconductor device.

10. (Original) A method comprising:
identifying a pair of features to be printed using a corresponding pair of patterning elements, the pitch of the pair of features being sufficiently small that, upon printing, diffraction will make a separation between the features smaller than a separation between the corresponding pair of patterning elements; and
increasing a dimension of at least one of the pair of patterning elements in a direction perpendicular to the sufficiently small pitch.

11. (Original) The method of claim 10, wherein increasing the dimension of at least one of the pair of patterning elements comprises designing the patterning element to print a corresponding feature with a feature dimension in the direction parallel to the pitch substantially equal to a feature dimension in the direction perpendicular to the pitch.

12. (Original) The method of claim 10, wherein identifying the pair of features comprises identifying a contact pair to be printed on the substrate.

13. (Original) The method of claim 12, wherein identifying the contact pair comprises analyzing a machine readable description of one or more of the contact pair and the patterning element to print the contact pair.

14. (Original) An article comprising a machine-readable medium storing instructions operable to cause one or more machines to perform operations comprising:

identifying a pair of features to be printed using a corresponding pair of patterning elements, the pitch of the pair of features being sufficiently small that, upon printing, diffraction will make a separation between the features smaller than a separation between the corresponding pair of patterning elements; and

increasing a separation distance between the pair of patterning elements while maintaining the sufficiently small pitch.

15. (Original) The article of claim 14, wherein the operations further comprise distorting at least one of the patterning elements to have a decreased dimension in a direction parallel to the pitch in the vicinity of the sufficiently small pitch.

16. (Original) The article of claim 15, wherein the operations further comprise distorting the at least one

patterning element to have an increased dimension in a direction perpendicular to the pitch.

17. (Original) The article of claim 14, wherein the operations further comprise distorting the patterning element to have substantially the same area as the undistorted patterning element.

18. (Original) The article of claim 14, wherein the operations further comprise designing the patterning element to directly and indirectly pattern a feature with a feature dimension in the direction parallel to the pitch substantially equal to a feature dimension in the direction perpendicular to the pitch.

19. (Original) The article of claim 14, wherein the operations further comprise analyzing a machine readable description of the desired corresponding contact pair.

20. (Currently Amended) An apparatus comprising:
a mask operative to image features using radiation having a wavelength, the mask including

an adjacent pair of ~~features~~ patterning elements having one or more distorted dimensions to accommodate for diffraction effects due to a size of the patterning elements and a spacing between the patterning elements approaching a diffraction limit of said radiation, wherein the dimensions of

the patterning elements are distorted relative to dimensions of the imaged features.

21. (Original) The apparatus of claim 20, wherein the adjacent pair of patterning elements have a pitch, and wherein said distorted dimensions comprise an elongated dimension perpendicular to the pitch.

22. (Original) The apparatus of claim 20, wherein the adjacent pair of patterning elements have a pitch, and wherein said distorted dimensions comprise a shortened dimension parallel to the pitch.

23. (Original) The apparatus of claim 20, wherein the adjacent pair of patterning elements have a pitch, and wherein said distorted dimensions comprise a bowed portion in at least one of the patterning elements.

24. (Currently Amended) The apparatus of claim 20, wherein the dimensions are also distorted relative to other patterning elements in the mask operative to image corresponding features, but which do not approach the diffraction limit of the radiation.

25. (Original) The apparatus of claim 20, wherein the adjacent pair of patterning elements are operative to image a SRAM structure.

26. (Original) The apparatus of claim 25, wherein the SRAM structure comprises a lone pair.

27. (Withdrawn) A system comprising:
a source of an electromagnetic wave emission;
a mask to direct the electromagnetic wave emission, the mask including a pair of patterning elements having a patterning element pitch, a first of the patterning elements having a first dimension parallel to the patterning element pitch and a second dimension perpendicular to the patterning element pitch; and
a substrate patterned with the mask, the substrate including a pair of isolated features having a feature pitch, a first of the features corresponding to the first patterning element, the first feature having a first dimension parallel to the feature pitch and a second dimension perpendicular to the feature pitch, the feature first dimension larger than the corresponding patterning element first dimension and substantially equal to the perpendicular second dimension of the first feature.

28. (Withdrawn) The system of claim 27, wherein the patterning elements comprise apertures.

29. (Withdrawn) The system of claim 27, wherein the pair of isolated features comprises a pair of substantially tubular contact holes.

30. (Withdrawn) The system of claim 27, wherein the substrate includes a positive resist in which the pair of isolated features is defined.